THE PRAWN INDUSTRY OF THE MALABAR COAST.

BY

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(*With three plates*).

Introduction.

Though the resources of the prawn fisheries of the backwaters adjoining the south-west coast of India have been realized by the people long ago, only very recently have attempts been made to take the best advantage of the highly favourable physical and biological conditions enabling the culture of edible prawns on a large scale. As fresh prawns have a ready local market, they are caught and sold at random wherever they are available, and only in a few localities do we find prawn fishing conducted on an industrial basis, allowing of regular exports to other places. The importance of the industry has been realized only by a few even in these days and there is much to be done for the betterment of the existing conditions. There is excellent scope for prawn culture and prawn fishing in Malabar and the States of Travancore and Cochin; with properly planned marketing facilities, this will become an important commercial occupation as on the Bombay and Sindh coasts, if proper attention be paid both by the governments concerned and by the people. It will be well worth our while to examine the different aspects of an industry so full of promise. This study is made with particular reference to the conditions in Travancore, in order to compare them with those of the prawn fisheries of the Bombay Presidency, an excellent survey of which was recently conducted by Mr. H. S. Rai, under the auspices of the Bombay Natural History Society.[2]

General Considerations.

As is well known, the geography of Travancore is peculiar in having a large number of backwaters bordering the coast-line, into which open the many hill-streams from the Western Ghats. On the whole, the backwaters occupy an area of about 180 sq. miles. The chain of backwaters is separated from the sea by a narrow strip of land, composed of sand and black clay or silt, and varying from about ten miles to half a mile in width; and often the two come so close that only the sandy beach separates them. There are also frequent communications between the sea and the backwaters; either they are permanent openings allowing free admixture of salt and fresh-water, as at Neendakara and Cochin, or they are only periodical openings, allowing a flow of water from one to the other only during certain seasons of the year, as at Paravoor, Kayenculam, etc. In several places, the sand bank separating the sea and the backwater is so shallow as to allow the water to flow from the sea into the backwater during high tide. Owing to these factors and the 'brine percolation' throughout the coast, the backwaters contribute to the formation of characteristic brackish-water zones extending over a wide area in association with the low-lying lands, paddy-fields and the net-work of canals. During the South-West Monsoon, from June to September, the backwaters are in a flooded condition as the amount of water brought down by the rivers is immense and, at this time of the year, the water in them is almost fresh. The level of the water considerably falls after the North-east Monsoon, during November, when the secondary maximum period of rainfall is passed. A month hence, the water in the backwaters is distinctly brackish. The optimum conditions for the life of brackish-water animals are obtained from January to March. Though the salinity is slightly higher in the succeeding months of April and May, the conditions are unfavourable as most of the shallow regions dry up during this period.

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[2] Rai, H. S., 'Shell Fisheries of the Bombay Presidency', Part II, *Journ., Bombay Nat. Hist. Soc.*, vol. xxxvi (1933).

As the paddy fields have an important rôle in prawn-fishing operations, some of the relevant details about these may be included here. There are usually two periods of paddy crops, one from December to March and the other from July to October. Prawn fishing is mostly carried on in the paddy fields; hence the prawn season corresponds to the period when the fields are uncultivated. In those parts of North Travancore where this industry has developed to a certain extent, the paddy fields adjoining the backwaters, *Pokkali fields* as they are called, are cultivated only once in the year, and that during July—October, unlike the fields far off (*Punja* and *Virupu fields*) which may annually yield two paddy crops and an intervening crop of pulses and vegetables. Prawn fishing is carried on an industrial basis only in Pokkali fields that remain uncultivated for the major part of the year. In southern and middle Travancore, the December-March period is the one in practice, though in many places, where the fields are on a higher level, there may also be a supplementary crop during the Monsoon.

THE PRAWNS OF TRAVANCORE.

The prawns that inhabit the backwaters include three groups of species: (1) brackish-water species which have made the backwater more or less their permanent home; (2) marine euryhaline species which periodically migrate into the backwater; and (3) migrants from freshwater to the brackish-water. The distinction between the first and the second groups is not easy as some of the marine prawns exhibit remarkable capabilities of adjustment and have a simultaneous distribution along the sea coast as well as in the coastal backwaters. Many of them are periodical migrants that live in the brackish water during their early and juvenile stages. Much remains to be known of the migratory habits of these prawns, but it has been observed in several places that the *Penaeid* prawns, which unlike most other Decapod Crustacea hatch out at an early developmental stage as tiny pelagic nauplii, enter the backwaters as young ones, and grow there for about an year, after which they go back to the sea to breed.[1] [2] It is highly probable that the conditions in the brackish-waters at the mouths of rivers and adjoining backwaters where a large amount of organic matter is brought down, being rich in food supply, afford optimum conditions for the quick growth of young prawns. In many of these species, acclimatisation for brackish-water life is only partial. Though inhabiting the backwaters during a phase of their life history, they are apparently unable to breed and propagate there. It may be that the sexually ripe individuals and early larvae are not able to survive low salinity conditions, and that the peculiar brackish-water environment is not conducive to the proper development and dehiscence of sexual products.

Of the three groups above enumerated, the first and the second are of greater commercial importance than the third, as fresh-water prawns have only a local sale in the fresh state. They comprise the species of *Penaeus*, *Penaeopsis* and *Parapenaeopsis* among the *Penaeidae*, and of *Leander* among the *Palaemonidae*. Rai observes that the most abundant species on the Bombay coasts are *Penaeus semisulcatus* de Haan, *Penaeopsis monoceros* (Fabr.) and *Leander styliferus* (M. Edw.). The common species of the Travancore coasts are *Penaeus indicus* M. Ed., *P. carinatus* Dana, *P. semisulcatus* de Haan, *Penaeopsis monoceros* (Fabr.), *P. dobsoni* (Miers), *P. lysianassa* (De Man), and *Parapenaeopsis stylifera* (M. Ed.). It is probable that the numerous other species recorded from other parts of India are also present here since many of them have a wide distribution in the Indo-Malayan coasts.[3] The fishing season for common prawns begins with the month of November and extends to about the close of March. This statement applies only to those localities in North Travancore where prawn-fishing has assumed something of the nature of an industry.

A few observations on the biology of brackish-water prawns may be included here. Adults of *Penaeids*, especially of *P. carinatus* and *P. indicus*, are beautifully coloured. The former is a deeply pigmented species, varying in shade from bluish brown to dark grey, with dark transverse bars on the abdomen, and bright yellow markings at the bases of the pleopods. *P. indicus* is pink with numerous red patches on the body. In both these species, the deep pigmentation is observed only in fully-grown individuals. *Penaeopsis monoceros* and *P. dobsoni* are somewhat semi-transparent when alive. Specimens of all these species turn red in alcohol or formalin.

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[1] Kemp, Stanley, 'Crustacea Decapoda', in the Fauna of the Chilka Lake, *Mem. Ind. Mus.*, vol. v (1915).

[2] Dakin, W. J., 'Presidential Address', *Proc. Linn. Soc.*, *New South Wales*, vol. lx, p. xxvii (1935).

[3] *Vide* Alcock, A., *Catalogue of the Indian Decapoda Crustacea in the Collection of the Indian Museum*, Part III, Fasc. i; Henderson, J. R., *Trans. Linn. Soc.*, vol. v, ser. ii (1893); De Man, *Siboga Expeditie*, vol. xxxix, Part I (1911); and Kemp, S., *Mem. Ind. Mus.*, vol. v, (1915).

The young prawns found in the backwaters always prefer a muddy bottom for their habitat. The question of their food habits needs much further elucidation; they appear to subsist mainly on algae at least in a few places investigated in detail by the author. Some of the larger fish found in the backwaters prey upon young prawns. Nothing is known of their moulting, but as will be shown later, their growth appears to be fairly rapid.

The freshwater prawns comprising the third group include several species of *Palaemon* which migrate into the backwaters when the latter have a low salinity. *Palaemon carcinus* Fabr. which grows to a large size is the common popular freshwater prawn of Travancore. The other species include *P. idae* Heller, *P. scabriculus* Heller, *P. sulcatus* Hend & Math., and *P. dolichodactylus* Hilgendorf.[1] Specimens of *P. carcinus* are available in large numbers in the lower reaches of most of the rivers; the season is from September to December; and an inquiry in the markets of Kottayam and other neighbouring places reveals that the largest specimens are obtained in the month of November. It is believed that the migratory individuals of *P. carcinus* are mostly the 'berried females', as judged by the proportion of sexes in fresh- and brackish-water. Henderson and Mathai[2] obtained both adult females and males from the brackish-waters near Cochin, and they state that this is the only species of *Palaemon* which they have met with in salt-water. Kemp,[3] however, has recorded several other species from brackish-water in the Chilka Lake and has made some interesting observations regarding their habits. So far as *Palaemon carcinus* is concerned, the larvae seem to be liberated in brackish-water, whence they migrate into freshwater and grow into the adult, a phenomenon quite contrary to that observed for Penaeid prawns. The migration of ripe individuals into the backwaters takes place soon after the monsoon, when the salinity is rather low.[4] According to the records of the Travancore State Fisheries Department, this migration for the liberation of the larvae occurs in October and November.[5]

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[1] Henderson, J. R. and Mathai, G., 'On certain species of *Palaemon* from South India', *Rec. Ind. Mus.*, vol. v, pp. 277-305, pls. xv-xvii (1910).

[2] *Ibid.*, pp. 277 and 282.

[3] *Op. cit.*

[4] Reviewing the conditions in the Chilka Lake, Kemp (*op. cit.*) observes:— 'Only females of *Palaemon malcolmsoni* and *P. lamarrei* have been found in the lake and our observations lead us to conclude that these species visit its waters only for breeding purposes. This is also the case with the remaining species of the genus, *P. rudis*, the males of which accompany the females at this period. Adults of these three forms do not live in water as salty as that of the Bay of Bengal; but the young of *P. rudis* were found in the outer channel at the salt-water season, while adults of *P. lamarrei* are able to tolerate a considerable degree of salinity. *P. malcolmsoni* was found only in freshwater.' (*Op. cit.*, p. 264. *Vide* also p. 203.)

[5] *Report of the Agricultural and Fisheries Department, Travancore State*, for 1097 M.E., Trivandrum.

HISTORY OF THE INDUSTRY.

On a rough estimate, it is about sixty years since the industry began in Travancore. Originally, the prawns were collected by ordinary fishing methods which did not involve any large scale fishing, and the operations lingered for the greater part of the year. The open backwaters and not the paddy fields were the fishing areas. As will be seen from the following accounts of the methods of fishing, this condition prevails even now in many parts of Travancore, though the yield from this is negligible as compared with that from the adjoining fields. Modern improved methods of fishing have been in existence only for the past twenty years. The industry first flourished in the backwaters adjoining Parur Taluk. Owing to an increasing demand for prawns and to the high prices which dried prawns began to fetch, the industry rapidly spread to the adjoining taluks of Sherthalay and Vaikam, and to several places in the Cochin State. This became more or less the regular occupation of fishermen inhabiting the banks of the Vembanad Lake, and several industrial establishments sprang up for the collection and preservation of prawns for the market. But hardly had the industry assumed a permanent character, when the price of dried prawns fell and the enthusiasm in this direction waned with the onset of adverse trade conditions. Before discussing this aspect of the question, the methods of capture and the processes involved in geting the prawns ready for the market may be considered.

FISHING OPERATIONS.

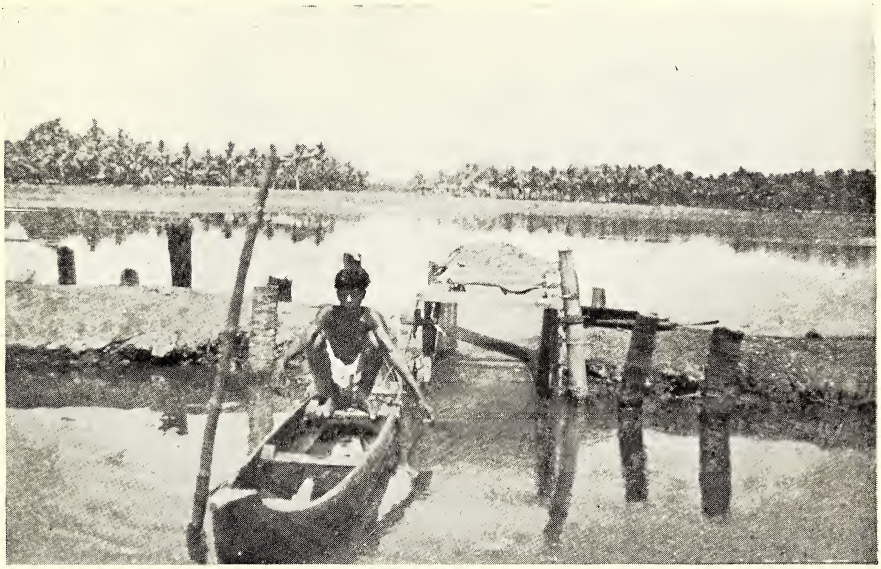
The season for the fishing operations commences in November, soon after the North-East Monsoon, with the gradual onset of brackish-water conditions in the backwaters. In Travancore, the brackish-water prawn fisheries are best exploited in the Taluks of Parur, Vaikam and Sherthalay. Of these, the produce from the first mentioned place is by far the most important and contributes to about fifty per cent of the total annual produce of the state. In the Cochin state, the important prawn-fishing centres are the villages adjoining the Narakkal canal.

The conditions in the fisheries of the Parur taluk may be taken as more or less typical. Here, the paddy fields closely adjoin the backwaters, and they are on a slightly higher level. As pointed out before, the paddy crop corresponds to a period when the water is fresh. The harvest being over by about the end of September, the fields are free, and for about a month or two the water from the backwaters is allowed to get in and out freely. The flooding caused by the October-November rains often keeps the paddy-fields in direct communication with the backwaters and associated canal systems. The fields contain a lot of organic matter like hay and the November floods bring down plenty of organic as well as inorganic materials. The bottom of the fields remains muddy owing to the loose consistency of the characteristic black soil. The activities of the prawn fisheries begin with the lowering of the water-level after the monsoon. The bunds surrounding the fields are strengthened and the communications between the canals and the fields are restricted to a few sluice gates, usually one for each field (Plate II, fig. 1). These gates are carefully guarded by elaborate wooden frameworks, and with the proper manipulation of a series of adjustable planks, the water level in the fields is carefully regulated. The rains having practically ceased, there is no appreciable flow in the canal systems, and the tidal effects are hence markedly felt. The water becomes increasingly brackish. The tidal range is subject to some amount of variation from place to place; it is maximum in places where the shallow waters have been re-claimed into paddy fields which, after reclamation, are cut off from the backwater, leaving only narrow canals amidst them. At Paravoor and Kayenculam, the range is two and a half feet, while in the canals associated with the prawn-fishing centres of Nedungad, Varapuzha, Ezhikara and Chathanad, the tidal range is slightly above the former, and the onset of ebb or flow is attended by a powerful flow of water.

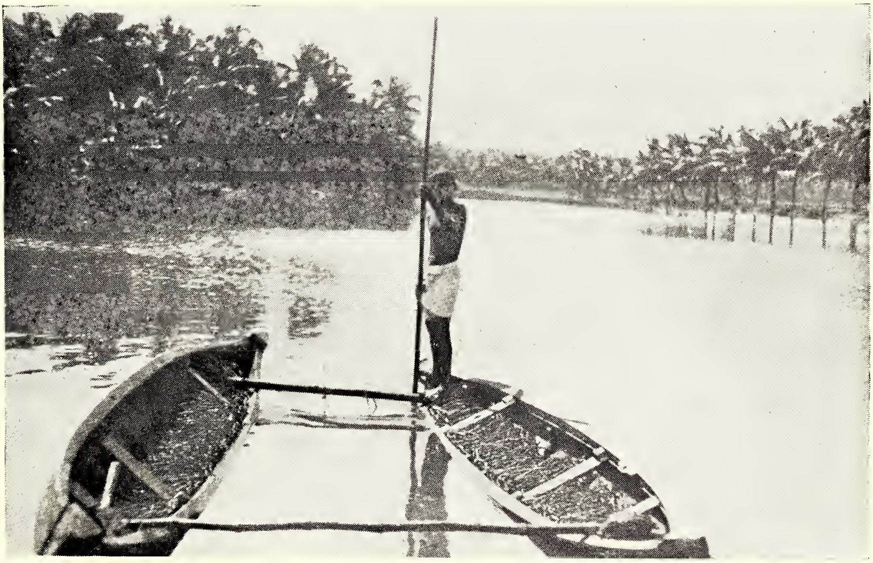
The tidal action is of great advantage to the fisherman. He keeps open the sluice gates during high tide and allows brackish-water to get in freely into the paddy-fields. The prawns, which abound in the backwaters at this period, get into the paddy-fields along with the inflowing water. The gates are closed with the onset of the flow tide. This process is carried on regularly for about a month, whereby the number of young prawns in the paddy-fields is gradually increased. To effect a proper change in the water of the fields, the gates are opened about thrice a week during flow tide and water is allowed to drain off to a certain extent. But to prevent the young prawns from escaping, the gate is guarded by a special contrivance, which consists of a number of flexible twigs of wood joined together to form a lattice-work.

The post-larval stages of *Penaeids* enter the backwaters wherever the latter are in communication with the sea. They are then beautifully transparent and usually measure 1-2 cm. in length. As we know nothing of the breeding habits of marine prawns, it is not possible to ascertain definitely the commencement and duration of the migration of young individuals into the backwaters. Young specimens ranging from 3 to 5 cm. in length are found in the backwaters during many months of the year, especially from August to December. This observation, considered along with the well known fact that most *Penaeids* are not known to breed in brackish-water, would suggest that several batches of young individuals from the sea enter the backwaters. Their rate of growth is astonishingly rapid. Nothing definite is known of the conditions favourable or otherwise to their growth. The prawns entering the fields vary in length from 5 to 8 cm.

The actual fishing of these prawns takes place only after two or three months from the time they have entered into the fields. There is, however, considerable variation from place to place in the period allowed to elapse between the time of entry of the prawns and the commencement of fishing. Size is the main

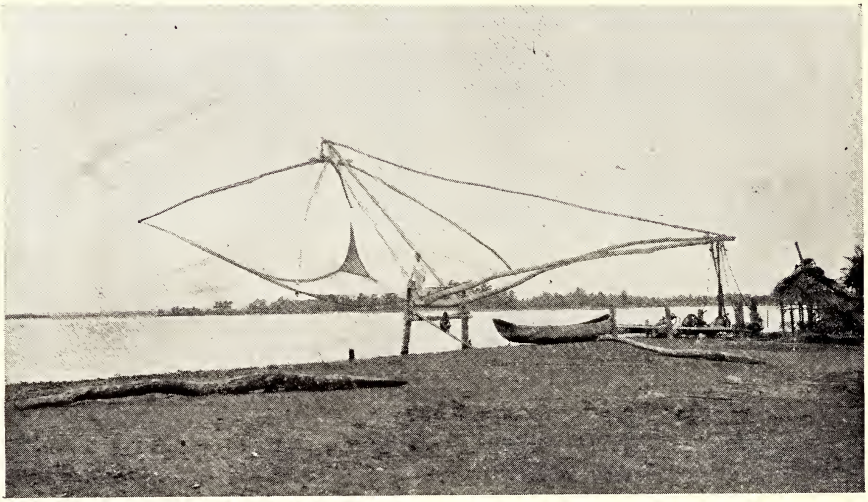


1. Bund with sluice gate.

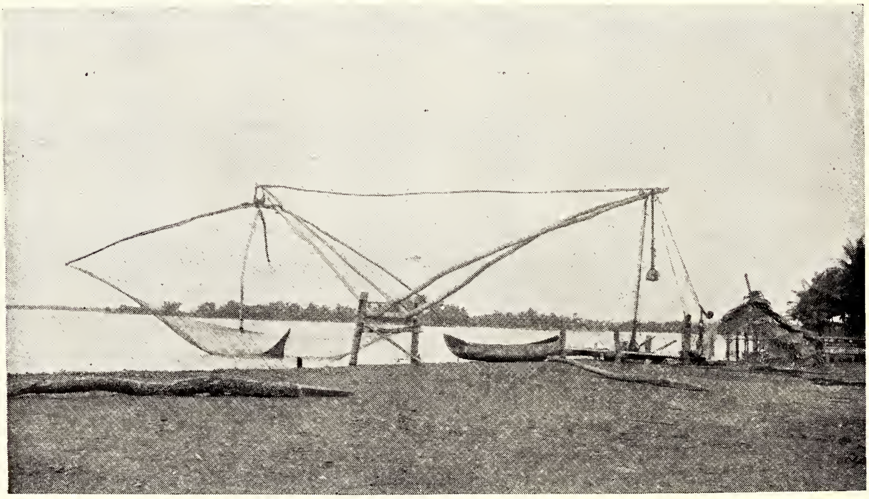


2. Two boats tied together to support the net between them.

Fishing with Chinese Nets.



1. The Net raised.



2. The Net lowered.

deciding factor; those usually fished from the paddy-fields are 8-12 cms. long; and the largest ones, obtained after some months since the beginning of fishing operations, are some 13 cms. long, which is about the maximum size to which *Penaeids* grow in brackish-water. With the increase in size of prawns in the fields, the salinity of the water also increases as the rains gradually diminish. This has given rise to a curious belief among the fisherfolk that the prawns really grow by absorbing more and more of salt from the water.

The commencement of the regular course of fishing is an exciting event for the fishermen. The first catch is usually made during the *Thiruvathira* festival which comes off at the end of December or at the beginning of January. A large conical net is fitted to the outside of the sluice gate, the wide portion surrounding the gate. This net is a strong one, with close meshes varying from ¼ to ½ inch and very much resembles the *bokshi* of Sindh coasts described by Rai. When the level of water outside the fields begins to fall with the onset of flow tide, the planks retaining the higher level of water in the fields are removed one by one, allowing the water to force its way outside. The numerous prawns that swim out of the fields are caught in the conical nets; they accumulate in the narrow side of the cone. Usually one man waits here and periodically removes the prawns, an easy process as the narrow side of the cone is adjustable.

Fishing is usually done at night and the period corresponds every day to the onset of flow tide; hence the successive periods change according to the phases of the moon. A powerful light is often placed in the sluice gate to lure the prawns to the net.

Fishing in backwaters and canals is also prevalent in addition to that of the paddy fields. Two characteristic methods of open backwater fishing are worthy of note. One is designed to capture prawns swimming in shoals. Two country boats are tied together as shown in the photograph (Plate II, Fig. 2), with the intervening space supporting large nets which trap the prawns that try to swim through. These boats are stationed in key positions frequented by the crustaceans.

The next method is an extremely picturesque one which no one who has visited these backwaters can forget. In almost every edge of the backwaters, a large stellar framework of wood may be seen, supporting large fishing nets locally called the *cheena valai* or *kamba valai.* This peculiar fishing implement is believed to be of Chinese origin, and it is considered as a remnant of ancient trade relations that existed between China and the West coast of India. Fishing with Chinese nets is not mainly intended for prawns; but the latter are caught in large numbers during their season of abundance. The method of fishing with the Chinese nets is an exceedingly simple process and will be clear from the accompanying photographs (Plate III, Figs. 1 and 2). Fishing is usually done only at night, and a lantern is hung to the wooden frame-work when the net is lowered into the water, so as to lure the prawns and fish to the net,

CURING OF PRAWNS.

Two industrial processes are in vogue for the preparation of prawns for the market: Sun-drying and boiling. The first process is the more common on the Bombay coast, while the latter method followed by drying is the more popular one in Malabar. On the West Coast, boiling is employed in all places where the produce is considerable and sufficient for export to other places. Sun-drying without boiling is employed in the preparation of prawns in those parts of Travancore where the produce is much less than in places like Parur Taluk; they form an article of cottage industry catering only to local demands. In both methods of preparation, the operations should be begun soon after the capture of the prawns, as putrefaction sets in rapidly. Usually, not more than three hours is allowed between the time of capture and the commencement of the first process. Boiling has the advantage of being partially independent of weather conditions. For boiling, the prawns are first put into wide flat copper vessels in a wet state, and often a little extra water is added to prevent them from getting roasted. They are boiled for about half an hour; and when they assume a dark reddish-brown colour, they are removed from the vessels and dried in the sun for several days. It should be noted here that in many places, salt is not generally added when the prawns are cured. The belief among those engaged in the industry is that the salt present in the brackish-water is sufficient for the purpose, and hence, salting is tabooed as being a deceitful measure to increase the weight of dried prawns. Rai observes that the fishermen of the Sindh coasts add a little salt to the fresh prawns when they are boiled. It appears that improper curing is the chief reason why the dried prawns from the West Coast do not remain long in a good condition.

The next process is to get rid of the shells, 'prawn-skins' as they are often called, which include the carapace, rostrum and limbs. For this purpose, large jute sacks are taken and filled with dried prawns to about a fourth of their capacities, after which they are closed and tied up. Women are especially in charge of this part of the work. They swing round each sack and hit it hard on a block of wood until the carapace and limbs fall off, leaving the fleshy parts intact. The latter are removed and sorted out separately; they are popularly called *prawn kernels*.[1] The kernels are once again dried; the pieces of shell adhering to them are carefully removed by hand; and finally, they are packed up in jute bags for export.

The discarded 'skins' are heaped up separately. They are of much use to the agriculturist as they form an important source of manure, especially for coconut palms. Their value as food for poultry has been realized only by a few. Large quantities of 'prawn-skin' used to be exported to Germany and other European countries; but of late, the exports have fallen considerably. The present market rate for prawn-skin varies from Rs. 8 to Rs. 10 per candy.

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[1] *Chemmeen-parippu* in Malayalam.

Marketing of Prawns.

Dried prawns do not command a wide market in India at present. The only place where they are in demand is the Bombay Presidency, where a portion of the local produce caters to the local demands. About half the produce of the Sindh and Bombay coasts is consumed locally, while the rest is exported to different places outside India, mainly to the Far East. The best markets for Indian dried prawns are Rangoon, Singapore, Colombo, Hongkong and Mauritius. As only fresh prawns are popular among people of the West Coast, especially in the important prawn-fishing centres, almost the whole of the produce that is boiled and dried is exported. From statistics available, Rangoon has been the best purchaser for many years. The dealers in Travancore send their supplies to businessmen in Rangoon, who dispose off the material. The price of dried 'prawn-kernels' ranged from Rs. 150 to 300 per candy before the present economic crisis; in some years (1929-30) the figure rose so high as Rs. 350 in the wholesale exporting markets of Cochin and Alleppey. Like all other commodities, the prices have fallen during the past few years; but recently, there has been considerable improvement, the figures having steadily risen from the lowest index of Rs. 50 per candy in 1933 to about Rs. 150 at the time of writing.

Improvement of the Industry.

In discussing the possibilities of improving the prawn industry on the West Coast, we have to examine critically the factors which have been responsible for the present fall in prices. As pointed out before, the general decline in price levels consequent on the current trade slump has considerably affected the commerce of prawns, but the fall in this instance has been mainly due to the numerous handicaps under which the present prawn dealer has to transact his business. First of all, there is no scheme of planned production. Secondly, the method of preparation of prawns for the market is very imperfect. Dried prawns from the West Coast are fit for human consumption only for about four months from the time they are dried and packed. In this respect, the West Coast producer is unable to compete with his Bombay competitors who sell goods of a better quality. The markets where prawns from the West Coast are in demand are rather few at the present time; in these few places, the goods are sold by middlemen. For example, the producers in Cochin and Travancore export their goods to brokers in Rangoon, who sell them to the local dealers under the current market rate, and often take a very high percentage of discount for their services. There have been occasions when about 50 per cent of the net proceeds have been discounted by these agents; and further, prohibitive charges are made for retaining the unsold goods in the godowns. In spite of all these handicaps, the industry has slowly progressed since the capital required is so small as compared to the profit. Whatever the producer gets from prawns is a decent income which compares very favourably with